

Tonawanda Coke Soil Study

6 month report

June 1, 2017

Introduction

This report covers the initial period of the Tonawanda Coke Soil Study, and includes efforts from the Department of Chemistry at the University at Buffalo, SUNY, Department of Chemistry at SUNY Fredonia and efforts from Citizen Science Community Resources (CSCR). Attached is a summary of activities from CSCR (appendix 1).

The report will cover initial startup activities (hiring, organization, community outreach and education) and planning for the program of soil sampling in two phases. Phase 1 sampling is being accomplished presently and will continue during summer and fall of 2017, followed by analysis of the testing data and reporting to residents and companies who participate (participants) followed by the development of maps of pollutants which are elevated above soil cleanup objectives (SCOs) and the identification of “hot spots” that can be investigated in Phase 2. Phase 2 sampling will take place in Summer and Fall 2018 with data analysis to present a comprehensive picture of the legacy of pollution in the Town and City of Tonawanda, parts of North Buffalo, Black Rock and Riverside neighborhoods in the City of Buffalo and portions of Grand Island.

We have just commenced the initial sampling and analysis of 30 samples in a pilot study to develop and test the process of collecting samples, getting results from the testing laboratory, developing a sample report for the participants and testing the boundaries of the sample area.

Startup organization

During Fall 2016 we hired staff and students for support of the community based sampling teams and data analysis. Dr. Joshua Wallace (Ph.D. Environmental Chemistry, presently a law student at UB), and Dr. Tammy Milillo, Research Assistant Professor of Chemistry at UB and an experienced environmental and analytical chemist, with special experience and publications in geographic information analysis of environmental data were hired as senior staff to manage the collection of samples, data analysis and reporting. Kathryn (Katie) Little was hired February 1st following a search by UB along with the UB Health Study leadership (Prof. Matthew Bonner, Jackie James-Creedon of CSCR and Soil Study PI Prof. Joseph Gardella). In addition, four UB students have been hired, Jonathan Rusch, Alexander Rusch (veteran volunteers with CSCR), Matthew Falcone a senior in environmental engineering and Elizabeth Lee, a masters student in environmental geochemistry.

Dr. Milillo is experienced in the development of geographic information analysis of environmental pollution data having worked on several projects in WNY examining legacy pollution in neighborhoods. She will collect the sample testing results in a Geographic

Information Systems (GIS) database and create maps of pollutants with elevated levels. The process of the study is described in Appendix 2 a recent presentation given to community members in meetings organized with local elected officials of municipalities.

Dr. Wallace will also contribute on testing specifically for chemical compounds that can be identified with emissions from Tonawanda Coke. Since we are sampling soil in areas surrounding the industrial area of the Town on Tonawanda, and there are many sources of air pollution emissions, we must develop a strategy to identify the portion and identities of the pollutant elements and compounds that are unique to Tonawanda Coke and apportion those compounds to TCC as the source. The separation of an environmental sample which includes contributions from different sources is termed source apportionment. Dr. Wallace will use innovative mass spectrometry and multivariate statistical methods to collaborate with Professor Michael Milligan (coPI of the study at SUNY Fredonia Department of Chemistry) to identify and then determine the extent of pollution contributions from Tonawanda Coke Corporation.

A significant effort was put into the process of selecting a certified testing laboratory for the core efforts of soil analysis. Given the size of the contract to do testing in Phase 1 (tentatively 300 samples) we knew based on experience that the overall contract might be over \$100,000 (as estimated in our budget). Thus, SUNY regulations covering contract required a bidding process. Dr. Wallace worked with the team and UB Purchasing to develop a bid specification and identified several testing laboratories with NY State Health Department testing laboratory certification, and having environmental testing capabilities.

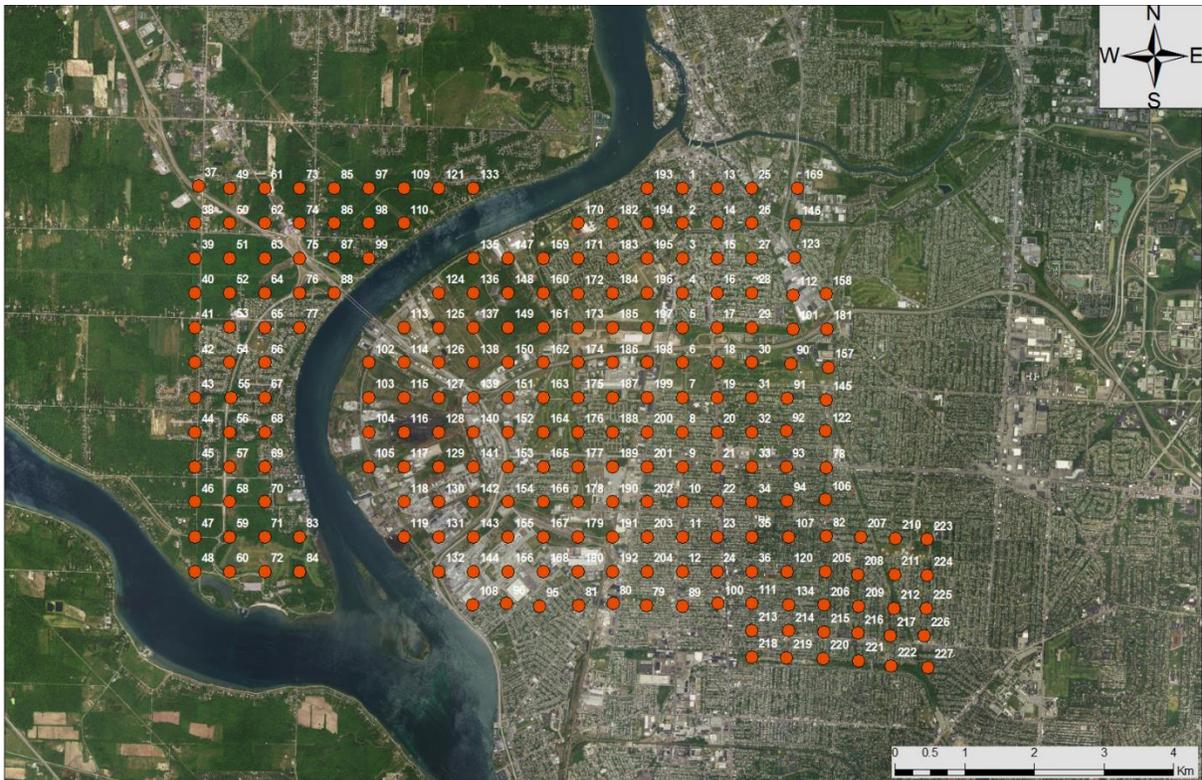
Three labs in the region responded to the bidding process, and after significant notification, ALS Laboratories in Rochester, NY was chosen. ALS is formerly known as Columbia Laboratories, and that Columbia Laboratories was the company that performed the initial air sampling test that identified high benzene concentrations in Tonawanda. Dr. Wallace then worked out details of sample pickup and testing results.

ALS indicated that they would be using a secure digital process to report testing results digitally to UB. This required us to develop a digital data security plan. We have developed such a plan for security of the data.

Outreach and Community Education

The initial months of the study revolved around organizing community meetings with elected officials and then open meetings hosted by elected officials on Grand Island, the Town of Tonawanda, City of Tonawanda and a presentation at the City of Buffalo Common Council Community Development Committee by Joe Gardella and Katie Little.

More recently, a grid sampling plan was developed (Figure 1) (below).



This grid sampling plan is still under revision with input from the community

We have developed a pilot study of thirty samples in the southeast corner of the grid (see Figure 1) to determine the eastern edge of the grid and answer questions about recruiting participants, gathering permission in two stages and developing materials for the reporting to participants. The sites for those thirty samples were identified by efforts with Katie Little, student support and CSCR efforts to recruit participants. Two items in Appendix 3 and 4 are a draft Frequently Asked Questions (FAQ) sheet and ToxFAQs¹ which give the participants health impact data for pollutants detected in the testing.

We also developed a list of Soil Cleanup Objectives (SCOs) for all the chemicals that were being tested. SCOs are quantitative values that guide federal and state agencies, contractors and others determining the environmental risks and potential for remediation of soil contaminants. We examined all the values available from NY State and also considered values from Pennsylvania, Massachusetts and other states in the northeastern US. We developed a list of SCOs based on the most conservative values for resident's protection.

¹ ToxFAQs (<https://www.atsdr.cdc.gov/toxfaqs/index.asp>) are documents for specific chemicals of environmental health concern developed by the US Centers for Disease Control Agency for Toxic Substances and Disease Registry (ATSDR). These are useful summary for the general public of the risks and concerns for exposure to dangerous chemicals.

We have begun the analysis of the data and developed a reporting format for the results to the participants. The reporting approach gives a summary of all tests for chemicals in three categories:

1. Those tests that yielded no detectable results², below the limit of detection (LOD)
2. Those tests that yielded concentrations above the LOD but below the Soil Cleanup Objectives (SCO)
3. Those tests above SCOs

We included federal TOX FAQs for all chemicals that exceeded SCOs as a means of beginning a conversation with participants regarding the environmental health impacts of the results from their property.

Next Steps

We are planning for a meeting in July to report the results from the pilot testing. We have developed a plan to use a standard EPA meeting format which starts with individual tables for meeting with individual participants to explain their results and answer questions. A second, collective meeting of all participants to ask general questions is then held. Finally, we would have a third portion open to the public to report general results from the initial testing. We hope that this meeting format will be useful for future meetings to discuss results but retain confidentiality of results for the participants.

We are planning to continue collecting permissions and continue sampling through the summer and into September and October, weather permitting to complete Phase 1 following the sample grid plan shown in Figure 1.

We also have made contact with representatives of Tonawanda Coke to arrange to meet and discuss the collection of the required samples from their corporate site.

² Testing results that are below the limit of detection (LOD) for the test are reported as such. This does not mean that the result is zero, it is not detectable. This is the response as defined by federal and NY state regulations for environmental testing results.

Appendix 1

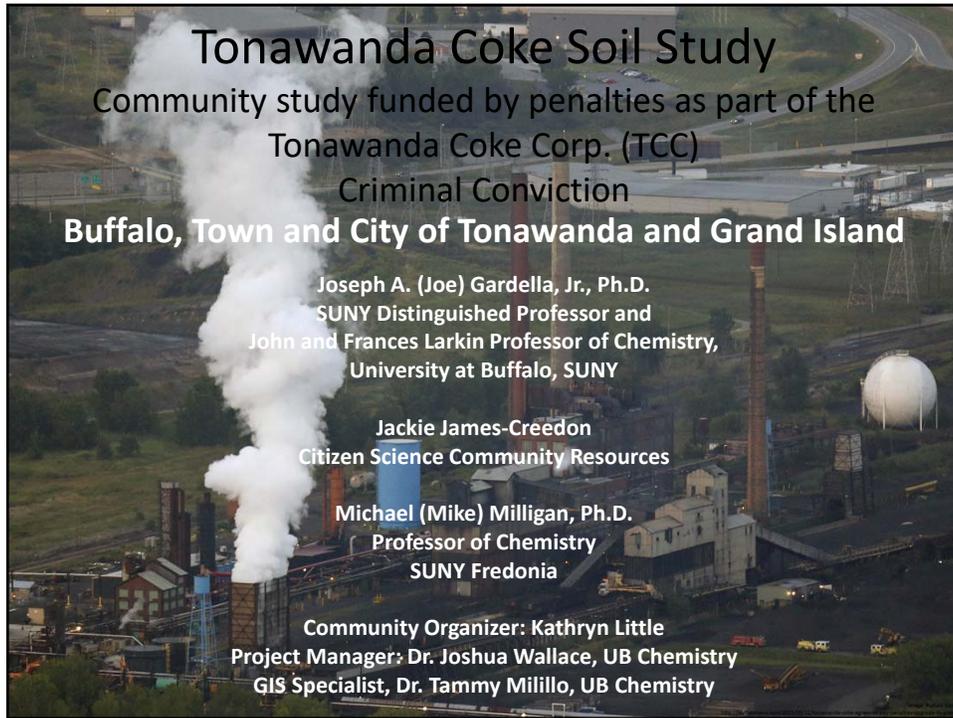
Report from CSCR

Wellness Institute/UB - Tonawanda Coke Soil Study , First 6 month Progress Report
 Nov 1, 2016-April 30, 2017

Date Completed	Task	Director/Jackie	Organizer: Katie
10/1/16	Locate community office	✓	
11/15/16	Form Community Advisory group- initial meeting	✓	
11/1/16	Set up community office and training center	✓	
11/1/16	Formed Community Advisory Committee (CAC)	✓	
11/15/16-12/3/16	Grand Island Collaboration, Press Release and Community Meeting	✓	
2/1/17	Hire Community organizer	✓	
3/15/17	Documentation (info, permissions, canvassing kits)	✓	✓
on going	Contact and meet with elected officials	✓	
2/1/17-2/16/17	City of Tonawanda Collaboration, Press Release and Com. Meeting	✓	✓
3/1/17	Develop strategy for first round of canvassing (Kenmore)	✓	✓
03/15/17	Develop Community Education Center	✓	
on going	developed brochures, education and training materials	✓	✓
3/15/17	Soil Sampling Training 1 (Students: josh, Jon, Alex, Evan, Katie)	✓	✓
3/15- 3/30	Flyer- south east side of project boundary	✓	✓
3/30/17	Town of Tonawanda Collabortation, Press release and Com. Meeting	✓	✓
04/01/17	Provide UB with 6 mos update	✓	
4/1- 4/20	Confirm/secure/schedule dates and times for sampling locations (kenmore)		✓
4/19/17	Meet with Collaborators (EPA, DEC, DOH)	✓	✓
11/1/16-4/30/17	Held 5 CAC Meetings	✓	✓
4/15-4/30	Soil sampling- 30 samples (Kenmore)		✓

Appendix 2

Presentation of overview of the Soil Study given at recent community meeting



Tonawanda Coke Soil Study

Community study funded by penalties as part of the
Tonawanda Coke Corp. (TCC)
Criminal Conviction
Buffalo, Town and City of Tonawanda and Grand Island

Joseph A. (Joe) Gardella, Jr., Ph.D.
SUNY Distinguished Professor and
John and Frances Larkin Professor of Chemistry,
University at Buffalo, SUNY

Jackie James-Creedon
Citizen Science Community Resources

Michael (Mike) Milligan, Ph.D.
Professor of Chemistry
SUNY Fredonia

Community Organizer: Kathryn Little
Project Manager: Dr. Joshua Wallace, UB Chemistry
GIS Specialist, Dr. Tammy Milillo, UB Chemistry

DEC (EPA) 2007-08 yearlong study using stationary monitors



- Study showed high benzene emissions, due to Tonawanda Coke Corporation,
- Tonawanda Coke misrepresented emissions in TRI and other reports

US Dept. of Justice Lawsuit vs. Tonawanda Coke Corporation

- Decided in March, 2013: Appeal Denied Jan 2016
- Found TCC guilty of violations of US Clean Air Act
- Fined \$12.5M
- Additionally, directed \$12.4 M toward follow-up community studies
 - 10 year epidemiology and health (Tonawanda/Grand Island Health Study)
 - 2 year study of neighborhood for deposition of air pollution (**Tonawanda Soil Study**)

Status and Steps for Soil Study

- Planning for Multiphase Soil Study
- Soils sampled for heavy metals and a variety of organic EPA priority pollutants
- Phase 1 survey study using geographic grid design (Spring and Summer 2017)
 - Learn where hot spots or contaminated regions are
 - Determine whether hot spots are dangerous to health
 - Learn geographic extent of pollutant deposition
 - Learn what pollutants are distributed in the community
 - Learn what sources the pollutants came from
- Phase 2: Focus on hot spots to determine localized contamination problems (Fall 2017/Spring 2018)
- Ongoing community participation and education
- Innovative methods to identify source(s) of pollutants in air and soil (UB and Fredonia)
- Reporting to community

What are “hot spots”?

- A region or area known to have ***elevated*** or ***high*** concentrations of a contaminant
- Must define ***background*** levels to determine what values are elevated
- This is a common method for using census data and cancer incidence data to map hot spots of illness or disease

Definitions

- **Contaminant**
 - Any physical, chemical, biological, or radioactive substance that can adversely affect air, water or soil.
- **Background Level**
 - The concentration of a substance in an environmental media (air, water, or soil) that occurs naturally or is not the result of human activities.
- **Action Level**
 - The existence of a contaminant concentration in the environment high enough to warrant action or trigger a response.

EPA Terminology Service:

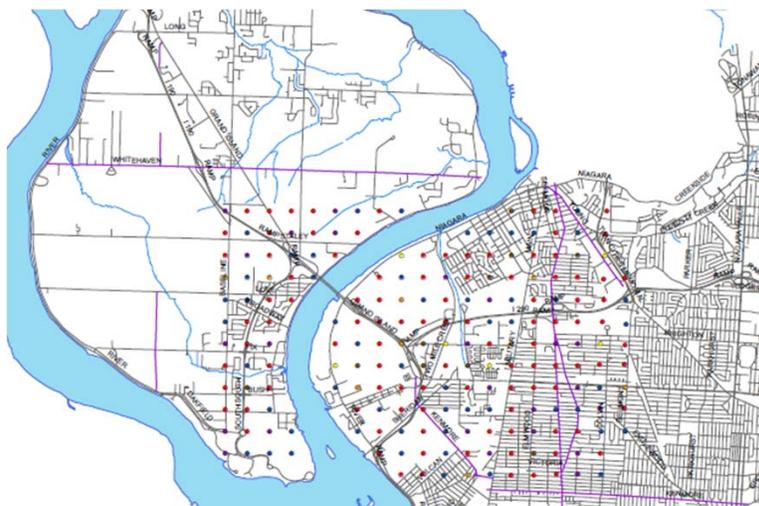
https://iaspub.epa.gov/sor_internet/registry/termreg/searchandretrieve/termsandacronyms/search.do

We will use GIS and GIA....

What are GIS and GIA?

- Geographic Information Systems
 - Computational methods to document, evaluate and map spatial relationships of data in a geographic area
 - Arc/Map is the software most commonly used
 - UB National Center for Geographic Information Analysis (NCGIA) is major resource for methodology and research
- Advantages
 - Creates a database of all features or characteristics of an area
 - Allows different types and sources of data to be combined without duplication
 - Displays data using geographic landmarks to show commonalities/clusters
- Geographic Information Analysis
 - Methods to interpret collection of individual data points
 - e.g. develop contour lines, regions, hot spots

Preliminary Grid Map



Phase I Proposed Plan



- 200 sample points
- First 30 at South East Corner to determine edge
- Darker areas are simulated hot spots

Community Involvement Options and Plans

Community members needed to:

- Participate on a soil sampling teams
- Participate on advisory committees

Residents or Property Owners asked to

- Allow access to enter, sample and test soil from owners property
- Reporting to individual property owners (confidential)
- Ask follow-up permission to include in analysis
- Covered by UB's Institutional Review Board for Human Subject Protections

Elected leaders asked to support the project by encouraging involvement

Citizen Science Community Resources is coordinating volunteers

Thank you!

- FAQ sheet
- Questions, comments, concerns

Appendix 3 Draft FAQ sheet for study

TONAWANDA COKE SOIL STUDY

FREQUENTLY ASKED QUESTIONS

UB, CITIZEN SCIENCES COMMUNITY RESOURCES AND SUNY FREDONIA

In federal court, the Tonawanda Coke Corporation was convicted of breaking serious environmental laws. Their pollution may have endangered the health and environment in our community. As a result of the court case, they are now required to fund work to help the community study and address its effects. The Tonawanda Coke Soil Study began planning in 2016. To learn more about the history of this issue, please visit www.csresources.org.

1. WHY ARE WE DOING SOIL TESTING?

Soil testing results will help the community learn how much pollution entered the soil around the plant. This knowledge is the first step toward cleaning up the mess left behind.

2. WHERE WILL WE BE SAMPLING?

Sampling will take place in the areas that are most likely to be affected. This includes: Eastern Grand Island 14072, Town and City of Tonawanda 14150, Kenmore 14217, and Black Rock/ Riverside 14207 and north western part of 14216.

3. WHO IS CONDUCTING THE STUDY?

This study is being conducted by faculty, research staff and students from the University at Buffalo Department of Chemistry, led by Professor Joe Gardella, as well as staff from the local nonprofit Citizen Science Community Resources, led by Jackie James-Creedon, and faculty and students from SUNY Fredonia Department of Chemistry led by Professor Michael Milligan.

In addition, EPA and DEC staff have been assigned to assist the study. Residents are an important part of this study's success!

4. WHAT IS THE PLAN FOR THE SOIL STUDY?

This study will have two phases. During the first phase, we will collect 300 samples from around the community, so that we understand which areas have been most affected. During the second phase, we will return to those areas to determine the size of hot spots in those areas.

5. WHEN WILL YOU START?

We are currently gathering equipment and locations for soil testing. We hope to begin testing in the Spring of 2017.

6. WHO WILL DO THE TESTING?

Testing will be done by an environmental testing laboratory.

7. WHAT ARE THE TARGET CHEMICALS OF THE TESTS?

Samples will be tested for a large range of EPA Priority pollutants by a NYS Dept of Health Certified Testing Laboratory and by UB and SUNY Fredonia. These will include heavy metals, volatile organic chemicals, Semi-volatile organic compounds, pesticide residues, PCBs, Polycyclic Aromatic Hydrocarbons and other products of the emissions from Tonawanda Coke.

8. HOW WILL YOU KNOW WHAT IS EMITTED FROM TONAWANDA COKE?

The Court ordered Tonawanda Coke to provide a soil sample from the business site, a sample of coke product and to sample the air emissions from the factory. This, along with additional testing conducted by UB and SUNY Fredonia, will help us understand whether Tonawanda Coke is the cause of the pollution.

9. HOW WILL THE SAMPLES BE TAKEN?

A study team will go door to door to ask for permission to sample soil from the top two inches of yard. We will be looking for areas that are uncovered by plants or grass. Results will be reported to the owner first. With permission, we will include their results in a map of the region's pollution.

10. WHAT ROLES WILL COMMUNITY MEMBERS HAVE IN THE DEVELOPMENT OF THE TESTING AND INTERPRETATION OF RESULTS?

We are excited to include community members in this project! We will be working with a Community Advisory Committee to help foster participation. We will need volunteers for soil sampling, volunteers for permission to test property, community input on project boundaries and how results will be shared and disseminated to the public.



CONTACT INFORMATION:

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Appendix 4 Example ATSDR ToxFAQ document

Polycyclic Aromatic Hydrocarbons (PAHs) - ToxFAQs™

This fact sheet answers the most frequently asked health questions (FAQs) about polycyclic aromatic hydrocarbons (PAHs). For more information, call the CDC Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to polycyclic aromatic hydrocarbons usually occurs by breathing air contaminated by wild fires or coal tar, or by eating foods that have been grilled. PAHs have been found in at least 600 of the 1,430 National Priorities List (NPL) sites identified by the Environmental Protection Agency (EPA).

What are polycyclic aromatic hydrocarbons?

(Pronounced pŏl'ī-sī'klīk ä'r'ə-mät'īk hī'drə-kar'bənz)

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

What happens to PAHs when they enter the environment?

- PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust.
- PAHs can occur in air attached to dust particles.
- Some PAH particles can readily evaporate into the air from soil or surface waters.
- PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.
- PAHs enter water through discharges from industrial and wastewater treatment plants.

- Most PAHs do not dissolve easily in water. They stick to solid particles and settle to the bottoms of lakes or rivers.
- Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate underground water.
- PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

How might I be exposed to PAHs?

- Breathing air containing PAHs in the workplace of coking, coal-tar, and asphalt production plants; smokehouses; and municipal trash incineration facilities.
- Breathing air containing PAHs from cigarette smoke, wood smoke, vehicle exhausts, asphalt roads, or agricultural burn smoke.
- Coming in contact with air, water, or soil near hazardous waste sites.
- Eating grilled or charred meats; contaminated cereals, flour, bread, vegetables, fruits, meats; and processed or pickled foods.
- Drinking contaminated water or cow's milk.
- Nursing infants of mothers living near hazardous waste sites may be exposed to PAHs through their mother's milk.

Polycyclic Aromatic Hydrocarbons

How can PAHs affect my health?

Mice that were fed high levels of one PAH during pregnancy had difficulty reproducing and so did their offspring. These offspring also had higher rates of birth defects and lower body weights. It is not known whether these effects occur in people.

Animal studies have also shown that PAHs can cause harmful effects on the skin, body fluids, and ability to fight disease after both short- and long-term exposure. But these effects have not been seen in people.

How likely are PAHs to cause cancer?

The Department of Health and Human Services (DHHS) has determined that some PAHs may reasonably be expected to be carcinogens.

Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).

Is there a medical test to show whether I've been exposed to PAHs?

In the body, PAHs are changed into chemicals that can attach to substances within the body. There are special tests that can detect PAHs attached to these substances in body tissues or blood. However, these tests cannot tell whether any health effects will occur or find out the extent or source of your exposure to the PAHs. The tests aren't usually available in your doctor's office because special equipment is needed to conduct them.

Where can I get more information?

For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.

Phone: 1-800-232-4636.

ToxFAQs™ Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaqs/index.asp>.

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m³). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 mg/m³ averaged over an 8-hour exposure period.

The National Institute for Occupational Safety and Health (NIOSH) recommends that the average workplace air levels for coal tar products not exceed 0.1 mg/m³ for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

Glossary

Carcinogen: A substance that can cause cancer.

Ingest: Take food or drink into your body.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.